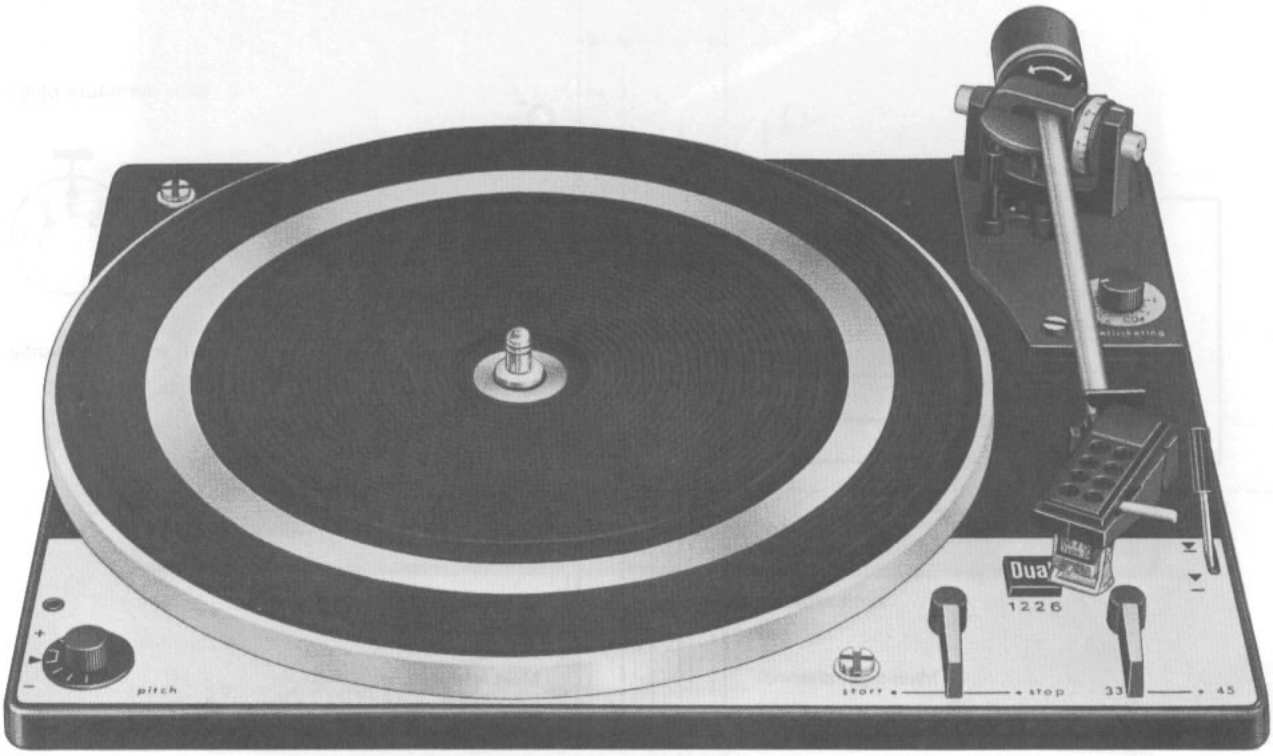
Dual

Dual 1226
Service Manual

Edition June 1974



Technical data

Current type	AC 50 or 60 cycle, with appropriate motor pulleys
Line voltage	110/130 V and 220/240 selector
Drive	Four-pole Dual asynchronous motor
Power consumption	< 10 Watt
Current requirements	approx. 64 mA at 220 V 50 cycle, approx. 115 mA at 110 V 60 cycle
Platter	non-magnetic 1,8 kg (4 lg) 270 mm (10.5 in.) diameter
Platter speeds	33 1/3 and 45 rpm, automatic tonearm setdown coupled to speed selector
Pitch control	Adjustment of approx. 1 semi-tone (6 %) at both platter speeds
Wow and flutter	< ± 0.12 %
Signal-to-noise ratio	Rumble signal-to-noise ratio > 57 dB Rumble unweighted signal-to-noise ratio > 38 dB in accordance with DIN 45 500
Tonearm	Torsionally-rigid tubular aluminum arm with vertical and horizontal pivot mounting
Tonearm bearing frictions	(referred to stylus top) vertical: less than 0.01 gram horizontal: less than 0.04 gram
Pick-up head (cartridge holder)	Removable, suitable for acceptance of all cartridges having 1/2" mounting and a dead-weight of 2 - 10 grams (including mounting fixtures)
Stylus pressure	Continuously-adjustable from 0 - 8 p, reliable as from 0.5 p stylus pressure
Pick-up cartridge	See separate data sheet
Weight	approx. 9.2 lb
Dimensions and mounting cutouts	see installation instructions

Dual Gebrüder Steidinger · 7742 St. Georgen/Schwarzwald

Fig. 1 Pick-up Connection Diagram

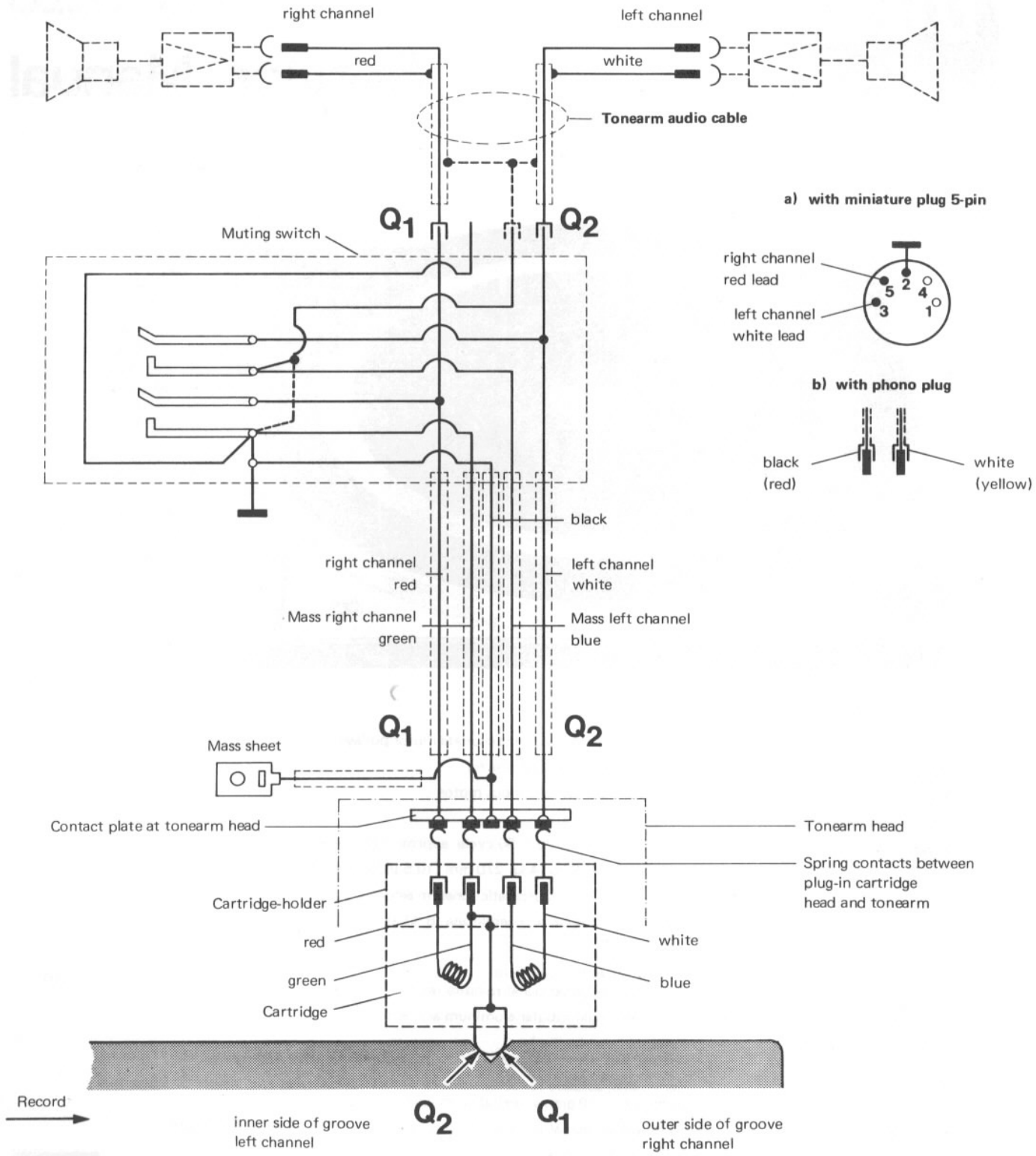


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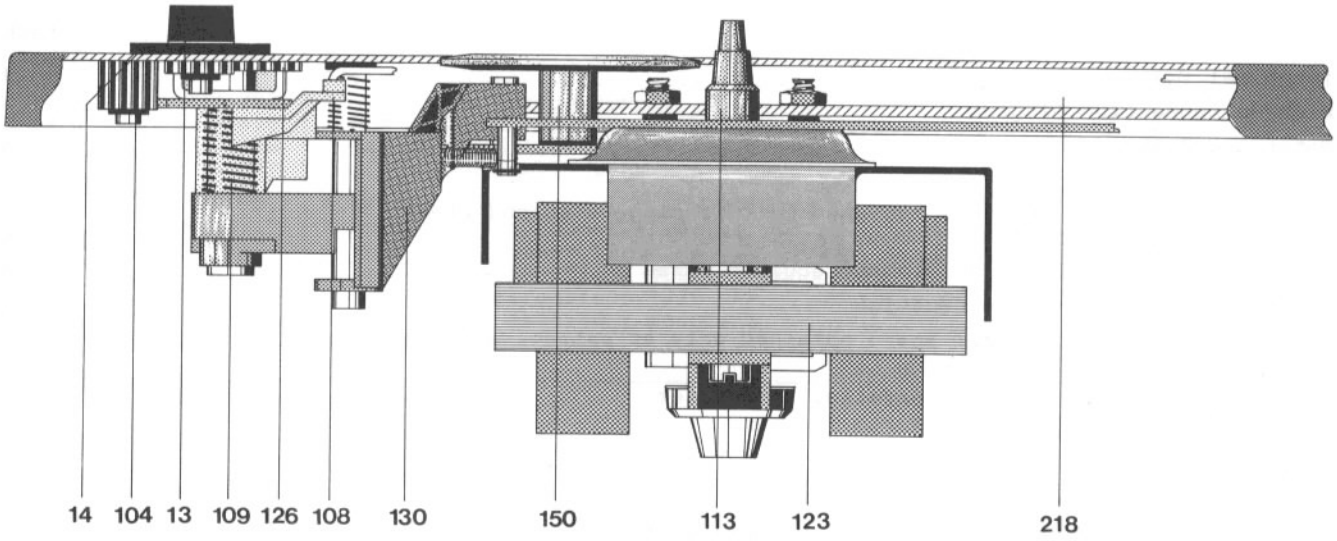
Fig. 2 Motor suspension and platter drive



Motor and Drive

The turntable platter and change mechanism are driven by a vibration-free four-pole motor (123) with an extremely low stray magnetic field.

Motor speed is constant for line-voltage variations of ± 10 %. It is dependent on (and proportional to) line frequency. Two interchangeable motor pulleys (120) are available for adapting the changer to 50 or 60 Hz operation:

Motor pulley for 50 Hz operation: part no. 232 898
Motor pulley for 60 Hz operation: part no. 232 899

The motor pulley is secured to the motor shaft by a setscrew.

The turntable platter is driven by the idler wheel (150) which is automatically disengaged from the motor pulley when the unit is shut off, in order to protect its driving surface.

Turntable speeds of 33 1/3 and 45 rpm are selected by raising or lowering the idler wheel (150) to the appropriate step on the motor pulley.

When the selector lever (44) is moved, the selector segment (108) rotates. The causes the lever (130) fitted in the slot of the selector segment (108) rotates. This causes the lever (130) fitted in the slot of the selector segment to move in vertical direc- pulley and set down again on the motor pulley step for the adjacent speed.

Fig. 3 Motor field connections (less connection plate)

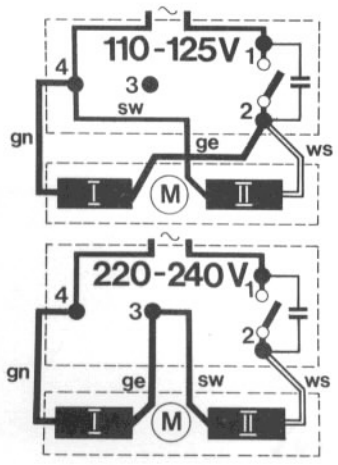
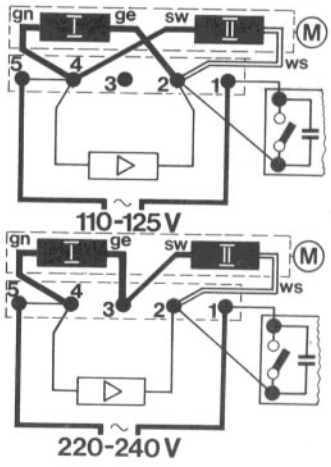


Fig. 4 Motor field connections (with connection plate)

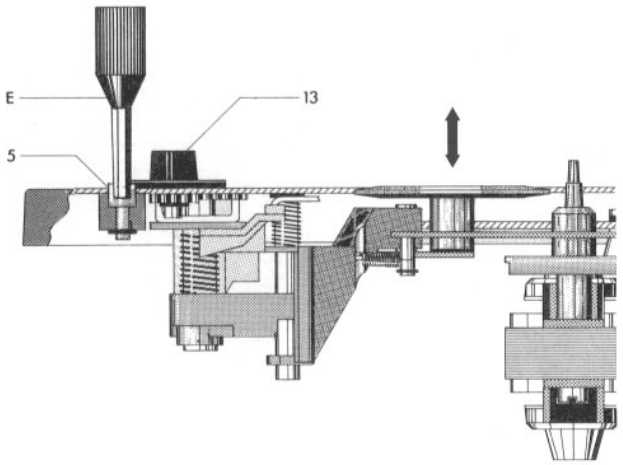


Pitch Control

For platter speeds of 33 1/3 and 45 rpm the unit incorporates a power-independent pitch control which permits a platter speed variation of up to 6 % (approximately one semitone).

When the pitch control knob (13) is turned, the switch segment (108) and the switch lever (130) attached to it are moved up or down. This vertical displacement changes the position of the idler wheel on whatever step of the motor pulley it has been placed, by the speed selector, and due to the tapered shape of the pulley effects approximately ± 3 % variation in speed.

Fig. 5 Position of idler wheel



Trouble	Cause	Remedy
Platter does not run when unit is plugged in and start switch operated	a) Current path to motor interrupted	a) Check connection at switch plate and voltage selector
	b) Idler wheel (150) not in contact with platter	b) Check switch lever assembly (130)
	c) Motor pulley loose	c) Tighten motor pulley
Platter does not reach required speed	a) Motor pulley is not correct for local line frequency	a) Change motor pulley
	b) Slip between idler wheel (150) and motor pulley (113) or platter	b) Clean friction surfaces of idler wheel, motor pulley and turntable platter. If necessary, replace idler wheel. Once the drive surface of the platter has been cleaned do not touch it with your fingers
	c) Excessive friction in motor, idler wheel or platter bearings	c) Clean and oil bearings
Rumble in reproduction	Worn idler wheel	Replace idler wheel (150), clean platter drive surface and motor pulley with greaseless solvent. (Once surfaces are cleaned do not touch them your fingers).
Correct nominal speed obtained only at extreme settings of pitch control	Idler wheel does not contact motor pulley correctly	Adjust position of idler wheel by turning adjustment screw (5) so that when the fine speed adjustment knob (13) is in the center position the correct nominal speed is achieved. (fig. 5)

Trouble

Tonearm head is not parallel to turntable platter.

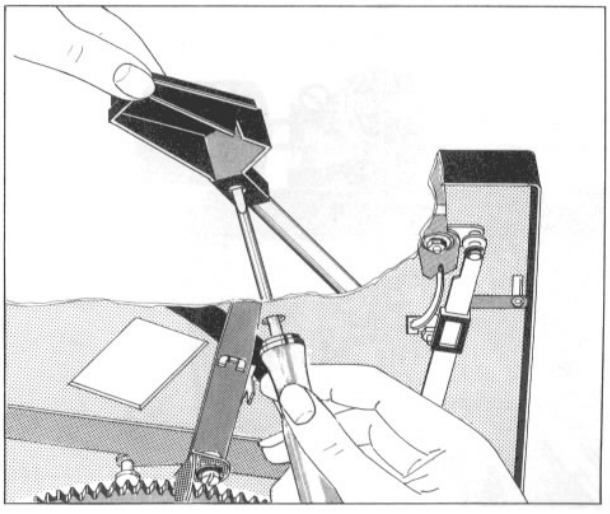
Cause

Orientation of tonearm head on tonearm tube has altered because of jolting in transport (shipping).

Remedy

Remove turntable platter with the help of a screwdriver inserted through the hole in the chassis placed there for the purpose. Loosen screw on tonearm head. After correcting the tonearm head, tighten screw. (Fig. 6).

Fig. 6



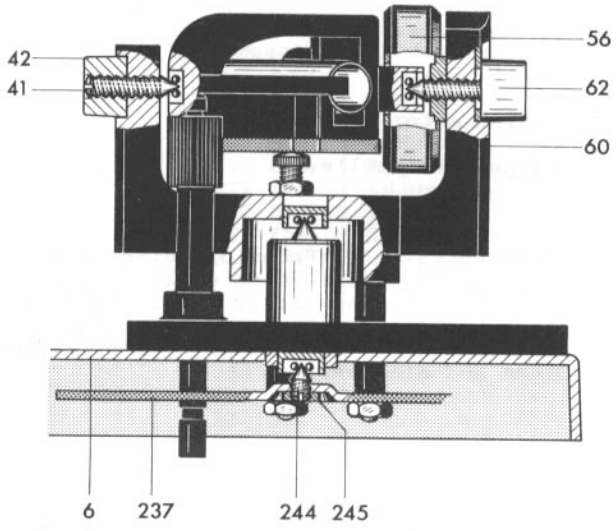
Tonearm and Tonearm Suspension

The tonearm of the Dual 1226 is counter balanced and pivot mounted vertically and horizontally. This provides extremely favourable tracking characteristics. The tonearm head is removable. To aid in replacing or adjusting the tonearm head a hole is provided in the chassis to facilitate adjustment of the tonearm head without first removing the tonearm. Before setting the correct stylus force for the cartridge which has been installed the tonearm should be balanced with the stylus force setting at zero. It is recommended that balancing should be carried out in the direct vicinity of the tonearm rest. This is carried out by rotating the counterweight.

The counterweight is designed so that it can balance cartridges with weights from 1 - 10 g.

For shock absorption (absorption of brief shocks) the counterweight is flexibly mounted on the tonearm and secured to prevent unintentional rotation. The tonearm head is designed to accept all cartridges with internationally standard 1/2" mounting centers and with a weight not exceeding 10 g. Stylus force is set by rotating the graduated spring housing (56) and thus tensioning or slackening the coil spring contained therein. The scale is calibrated for an adjustment range of 0 - 5 p, permitting accurate setting within that range in 0.5 p steps.

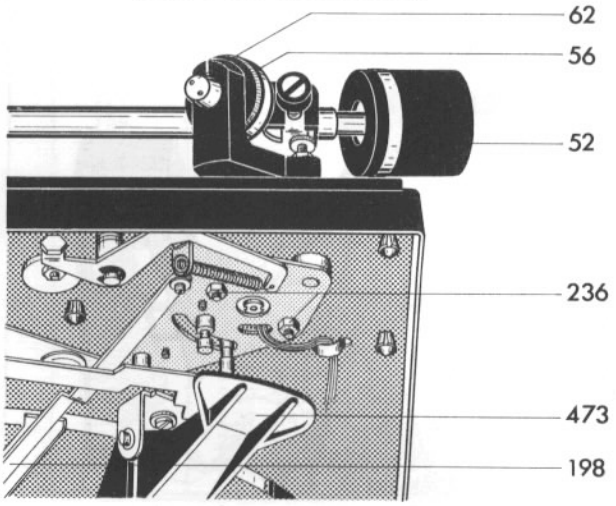
Fig. 7 Tonearm bearing assembly



To replace the complete tonearm and bearing assembly we recommend proceeding as follows:

1. Tighten unit in repair jig, set stylus force scale to zero and lock the tonearm in position.
2. Turn unit upside down, remove retainer sprin (193) and unsolder tonearm leads.
3. Slacken hexagon nuts (236) then remove tonearm.

Fig. 8 Tonearm bearing assembly (view from underneath)



Tonearm complete with bearing frame assembly should be refitted in reverse order. Before replacing the tonearm first loosen counternut (245) and slightly turn threaded pin (244). After reinstallation readjust play of bearing using the threaded pin (see page 7).

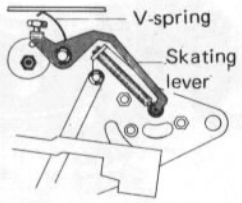
To remove the tonearm from the bearing frame unsolder the tonearm leads and set the tonearm tracking force scale to zero. Unscrew locknut (42) with setscrew (41) and bearing screw (62) (left-hand thread). Carefully remove tonearm from bearing frame.

Anti-Skating Device

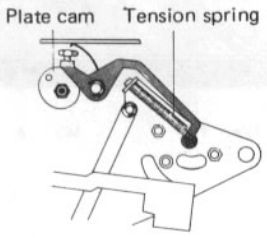
The geommetrically caused skating force acting on any tonearm is eliminated to a large extent in the case of the Dual 1226 by means of a precision antiskating device. The skating force is dependent on the tonearm geometry, on the stylus force and the tip radius of the cartridge stylus. The inward pull of the tonearm caused by the skating effect leads not only to undesirable jumping of the tonearm when set down on the record but also unequal forces on the two opposite groove walls with resultant unfavourable effects. These can be corrected with the aid of a suitable anti-skating device. By turning the knob (70) of the anti-skating device located on the cover the asymmetrical plate cam (230) is moved. This plate cam has two different curvatures which, according to the different scales used, for spherical and elliptical tip styli and for CD 4 pick up cartridges, move the skating lever (234) out of its position of rest and transmit the counter force to the tonearm by means of the tension spring (242). Skating adjustment is set at the works for conical styli with a tip radius of 15 ± 2 µm and for elliptical styli with measurements of 5/6 and 18/22 µm and also for CD 4 cartridges. The hexagon nut (231) is firmly tightened and locked with paint. Readjustment should only be attempted with the aid of the Dual Skate-O-Meter and the L 096 test record. This is best done by authorised Dual service station.

Fig. 9 Anti-skating force

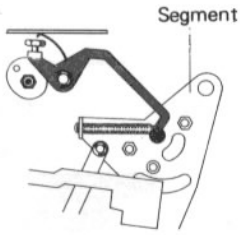
a) Anti-skating force 0-setting. No compensation of the skating force takes place as a result of the action of the tension spring at the fulcrum of the tonearm.



b) Anti-skating mechanism set to "1.5" on the scale for elliptical styli. Tonearm on tonearm rest. The tension spring produces the anti-skating force which is transmitted to the tonearm via the segment. The V-spring presses the skating lever against the plate cam.

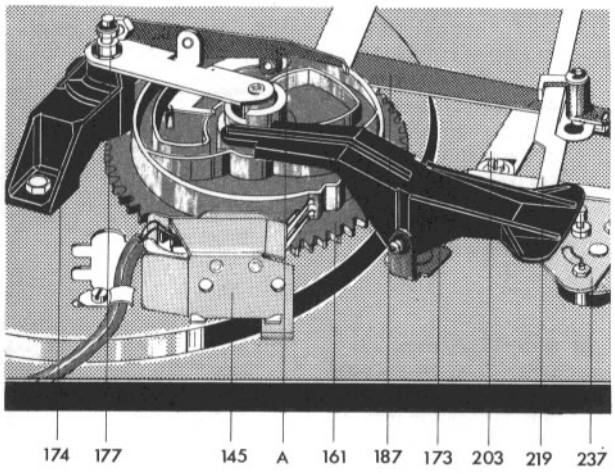


c) As "b" but tonearm above platter.



Trouble	Cause	Remedy
Stylus skips	a) Tonearm not balanced	a) Balance tonearm according to operating instructions
	b) Stylus force too low	b) Set stylus force to cartridge manufacturer's recommended value
	c) Stylus worn or chipped	c) Replace stylus
	d) Excenssive friction in tonearm bearing	d) Check tonearm horizontal pivot. Should have barely noticeable play. Adjust vertical bearing only with the left bearing screw (41) and the horizontal bearing screw (244). Horizontalbearing is correctly adjusted when the tonearm, with anti-skating 0.5 p, swings freely from center to rest.
	e) Ball (201) missing from shut-off rail	e) Replace ball (201).
	f) Anti-skating wrongly adjusted	f) Correct antiskating setting

Fig. 10 Tonearm guide mechanism



Tonearm Guide Mechanism

A guide groove located on the underside of the main cam (161) controls the automatic lift and set-down of the tonearm as the cam rotates through 360°. Tonearm lift and lowering are controlled by main lever (173) and lift screw (241). Horizontal movements are controlled by the main lever (173) with segment (237).

Automatic tonearm set-down is designed for 12" and 7" records and is coupled to the platter speed selector. Set-down points are determined by the spring pin of segment (237) contacting the positioning slide (219) which is only raised by the main lever (173) during the change cycle and thus moves within reach of the spring pin fitted on the segment. On completion of set-down or change cycle (tonearm sets down on the record) the positioning slide (219) is released again and returns to its normal position. It thus moves out of reach of the spring pin permitting the tonearm to move horizontally without hindrance while playing the record.

Tonearm Lift

The tonearm lift permits the tonearm to be set down on the record safely at any desired point outside the shut-off area.

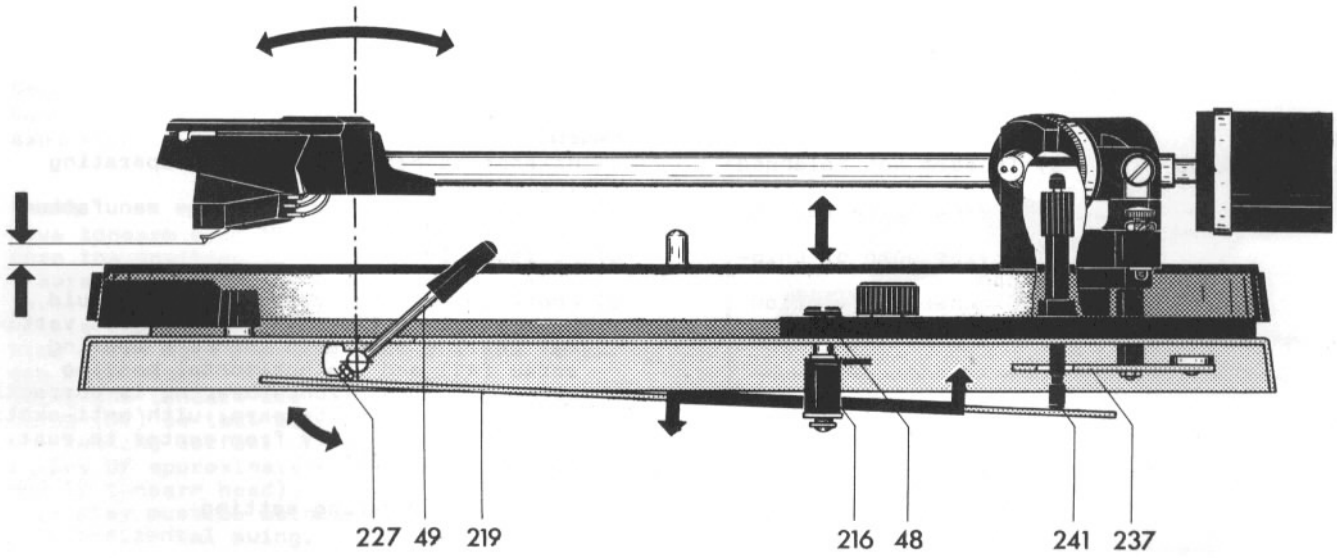
Moving the tonearm lift handle (49) forward causes lift cam (227) to rotate. This movement is transmitted via positioning slide (219) to the lift pin which then raises the tonearm.

After moving the tonearm (by hand) to the desired spot on the record the tonearm lift handle is tapped lightly (to the rear) to release the mechanism.

The positioning slide (219) is thus released and the tonearm descends slowly, controlled by the viscosity damped lift pin.

The height of the stylus above the record can be varied from zero to 6 mm by turning adjuster screw (48). Turning to the right increases the height, turning to the left reduces the height.

Fig. 11 Tonearm lift (tonearm raised)



Trouble	Cause	Remedy
Tonearm misses edge of record	a) Record setting incorrect	a) Carry out necessary adjustment by means of right-hand selector lever (44).
	b) Set-down point incorrectly adjusted	b) Set right-hand selector lever to "45". With a screwdriver inserted through the hole exposed turn eccentric pin until the tonearm sets down approximately 1.5 mm from the edge of the record. (Adjustment is only carried out for 7" records and is then automatically correct for 12" records).
	c) Record not standard size	c) Use standard record
	d) Friction surfaces of tonearm clutch dirty	d) Clean clutch surfaces
Tonearm strikes record during change cycle	Tonearm height adjustment incorrectly set	Adjust arm height with adjuster sleeve (48). Height is correct when stylus tip is 2 - 3 mm above selector lever (44) when arm is removed from rest.
Tonearm does not move onto record when drop cycle is started	Excessive damping caused by dirt in silicone oil in lift tube	Remove tonearm complete with bearing assembly (described on page 6). Remove lock washer (67), detach adjuster (68) sleever and remove second lock washer (67). Remove lock washer (224) on adjuster lever (221). Detach positioning slide from pin on adjuster lever, turn slightly until lift pin (241) is released. Remove lift pin. Clean lift tube and lift pin. Smear lift pin evenly with "Wacker silicone oil AK 500 000". Reassemble components.
Tonearm lowers too quickly when drop cycle is started	Insufficient damping caused by improper addition of lubricant to damping compound	Remove tonearm complete with bearing assembly (described on page 6). Remove lock washer (67), detach adjuster sleever and remove second lock washer (67). Remove lock washer (224) on adjuster lever (221). Detach positioning slide from pin on adjuster lever, turn slightly until lift pin (241) is released. Remove lift pin. Clean lift tube and lift pin. Smear lift pin evenly with "Wacker silicone oil AK 500 000". Reassemble components.
Tonearm returns to rest immediately after being placed on record manually	Shut-off mechanism has shifted out of position during shipping	Before using changer after moving, run it through start cycle with tonearm locked on rest (selector moved to "start").

Start Cycle

Moving the start switch (44) causes change lever (189) to rotate outwards. This initiates the following functions:

a) A lug rotates shift arm (187). The latter in turn by means of a tension spring moves the change lever (130) and thus the idler wheel (150) into engagement with motor pulley (113) and platter (12). At the same time the power switch (140) is actuated by the switch slide (181) coupled to the shift arm and the platter starts to rotate.

b) Change lever (189) is brought within reach of the cam follower lever (166) so that the letter is pushed into the change position after subsequent rotation of the main cam.

Fig. 12 Start position

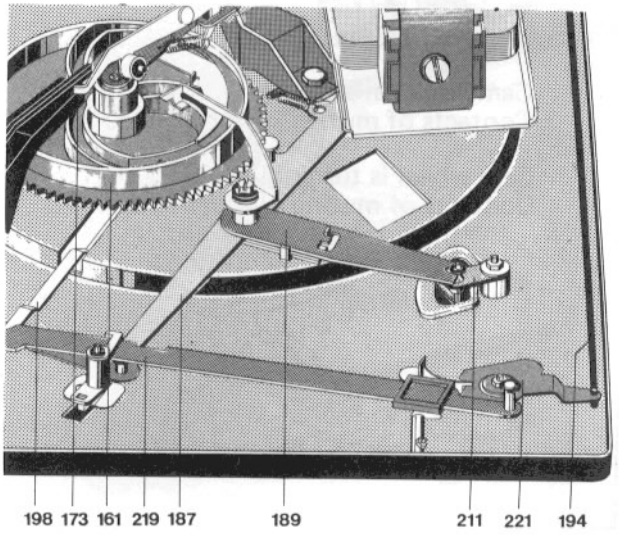
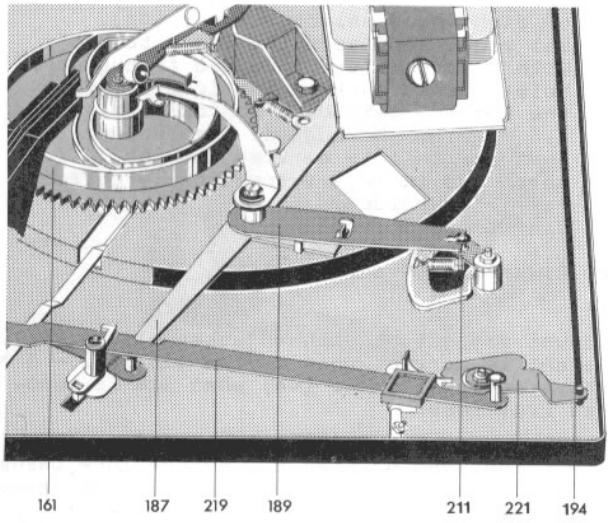


Fig. 13 Stop position

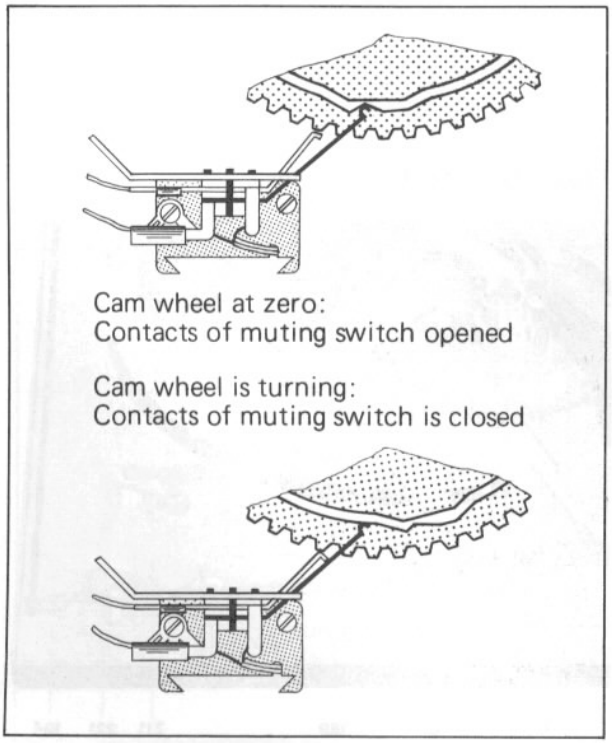


Moving the operating switch (44) also releases the start level (185) which is pulled towards the main cam by means of tension spring (184). By this means the shut-off lever (158) is moved within the range of the dog on the platter pinion thus driving the main cam. The change lever (189) is also locked. To prevent malfunctions the operating switch is locked in position during the start cycle (rotation of the main cam). Just before the main cam reaches neutral position (at the and of the change cycle) the start lever is pushed clear by the main cam and thus the operating switch and change lever are returned to their original positions. After installation and after moving the changer the unit should be started with the tonearm locked on the rest. This will automatically readjust the shut-off lever which may have shifted out of position.

Manual Start

When the tonearm is swung inwards by hand the pawl (203) on the shift arm (187) engages on a square end pin fitted in the chassis, retaining the shift arm in this position and thus the idler wheel (150) in engagement with the platter.
The slide (181) linked to the shift arm actuates the power switch and sets the platter in motion.
On reaching the run-out groove the tonearm automatically returns to its rest position and the unit shuts itself off. If, however, the tonearm is lifted off the record before completion of play and returned to the rest, the pin of segment (237) releasses the pawl (203). The tension spring (188) then returns the shift arm to its initial position, opening the power switch and disengaging the idler wheel.

Fig. 14 Muting Switch



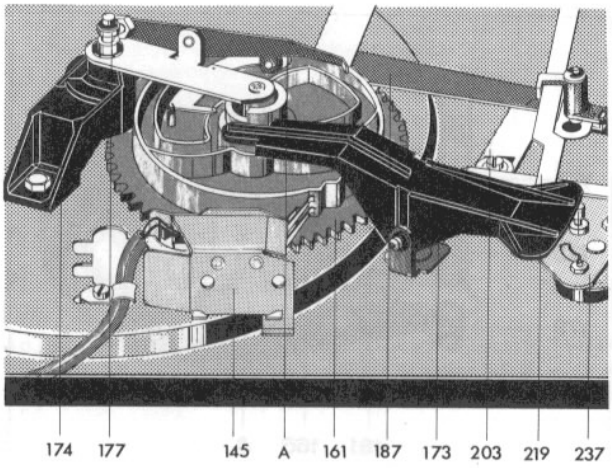
Stop Switching

When the operating lever is moved to "stop" only the starting lever (185) is drawn forward. As a result, the shut-off linkage engages with the main cam. The cam follower lever (166) remains in stop position. When the tonearm is on its rest and the operating lever is pushed to "stop", the change lever should not jam.

Muting switch

To prevent disturbing noise during the change cycle and during automatic operation of the tonearm the unit is fitted with a muting switch. Control of the switch springs for both channels is effected by the main cam. With the unit in position of rest the muting switch is opened.

Fig. 15 Record Drop



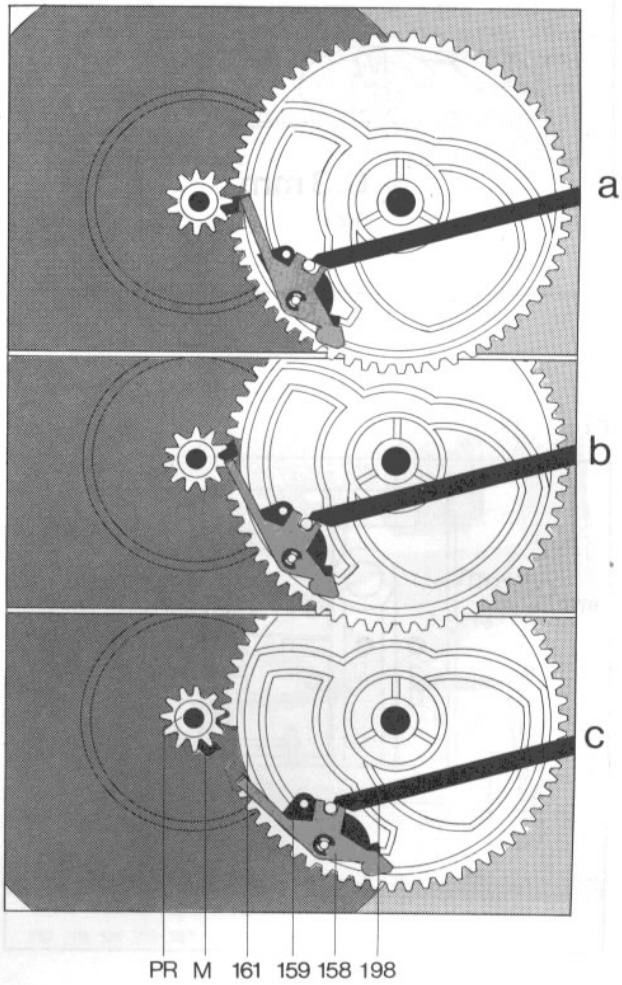
Record Drop

Insert the appropriate spindle - AW 3 for standard records (7 mm center hole) or AS 12 for 45 rpm records (38 mm center hole).

Record drop is initiated by rotation of the main cam (161) whose cam surface guides the cam rocker (A) and the change actuator stud (177). The resultant downward movement initiates record drop vis the changing spindle or automatic spindle.

The record drop cam is located on the main cam so that record drop can only take place when the tonearm is over the tonearm rest, what is to say, out of reach of the largest possible records (12" diameter).

Fig. 16 Actuating "change" or "shut-off"



Shut - off and Change Cycle

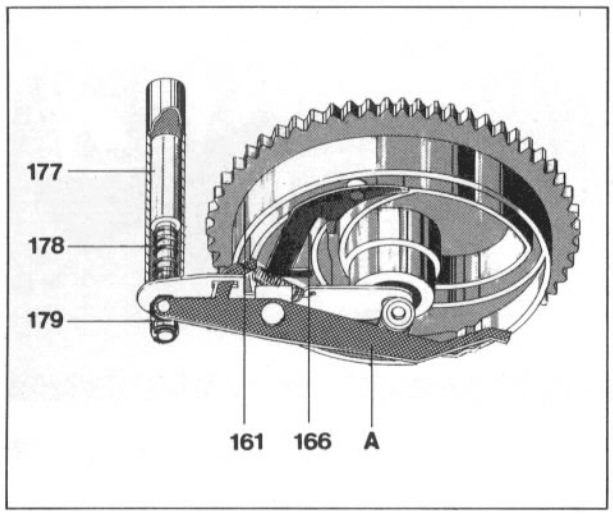
The dog (M) of platter pinion (PR) and shut-off lever (158) actuate both the change cycle at the end of the record and shutoff after the last record in a stack is played.

At the end of a record the tonearm moves towards the center at an accelerated rate due to the increased pitch of the grooves. This motion carries shut-off lever (158) towards the dog by means of shut-off slide (198). The eccentric dog pushes the shut-off lever (158) back at each revolution as long as the tonearm advance is only one normal record groove (Fig. 16 a).

The run-out groove with its steeper pitch moves the shut-off lever (158) against the dog with greater force so that the shut-off lever is picked up and moves with it. (Fig. 16 b).

The main cam (161) is thus moved out of its neutral position into engagement with the pinion of the platter. (Fig. 16 c).

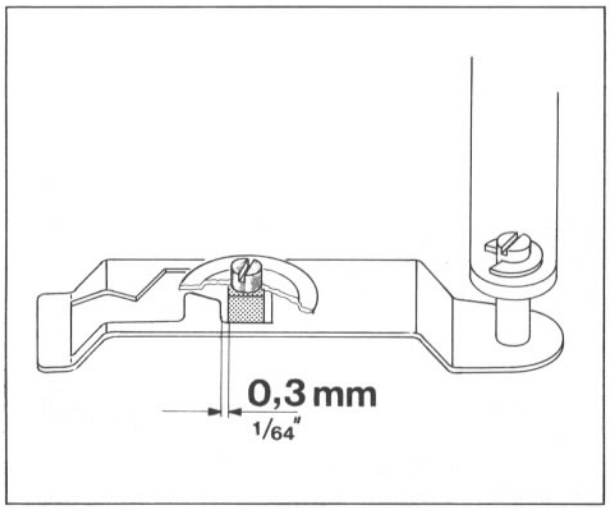
Fig. 17 Change Cycle



Shut-off Mechanism

The shut-off and change functions are determined by the position of the cam follower lever (166). After every start or record drop the cam follower lever (166) is moved to stop position by main lever (173) (longer end of the cam follower lever towards the center of the main cam).
As the record is dropped the cam follower lever (166) is turned to start position by cam rocker (A) so that the tonearm can swing in after record drop and be lowered onto it.
If there are no more records on the spindle its downward movement is locked and the cam rocker cannot turn the cam follower lever, the lever remains in stop position and causes the tonearm to lower onto its rest.
When main cam (161) returns to neutral position the lug of shift arm (187) is able to move into the recess provided in the main cam, actuate power switch (140) and disengage idler wheel (150).

Fig. 18

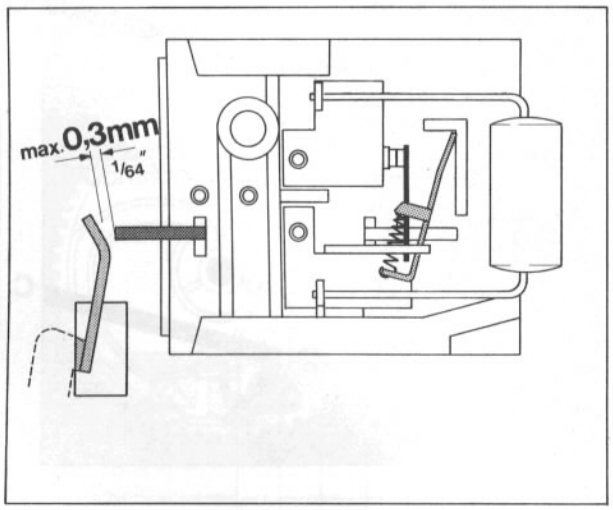


Trouble
Platter stops after automatic set-down of tonearm

Cause
a) Shift arm (187) not locked by pawl (203).
b) Power switch has interrupted power supply (has switched off).

Remedy
a) By turning the eccentric pin on the pawl
b) By adjusting switch slide (181) maximum play between switch slide and shift arm (0.3 mm).

Fig. 19



Trouble
The last record of a stack keeps repeating

Cause
Defective spindle

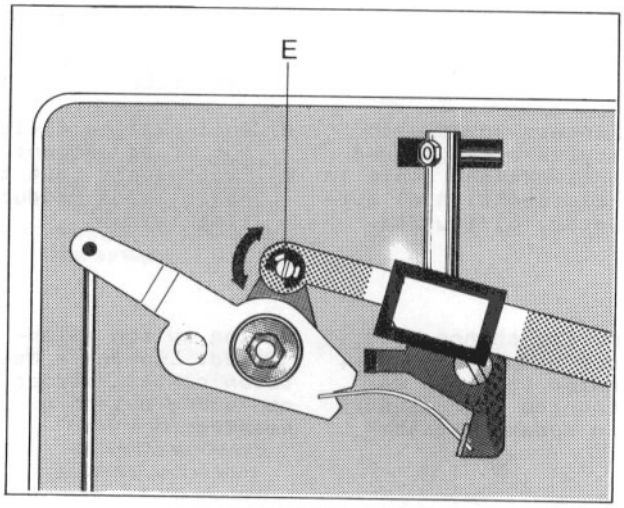
Remedy
Replace spindle

Trouble
After adjustment of the tonearm set-down point for 7" records the set-down point for 12" records is incorrect.

Cause
Eccentric pin (E) of adjuster lever (221) out of adjustment.

Remedy
Adjust tonearm set-down point by turning eccentric pin (E).

Fig. 20

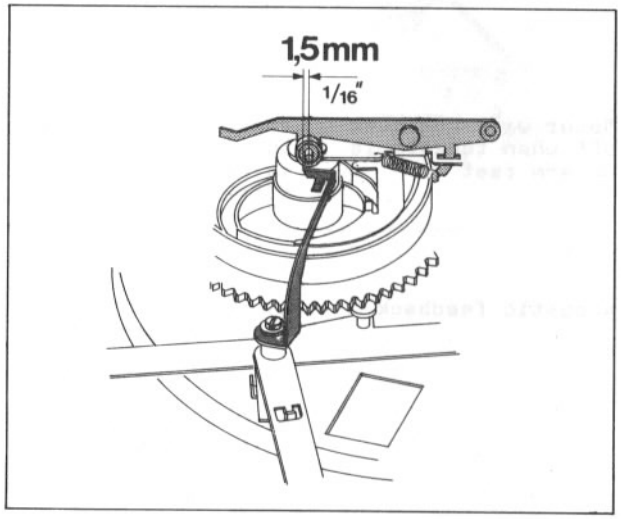


Trouble
Record drops when unit is switched to "stop"

Cause
Cam rocker (A) not locked by change lever.

Remedy
Adjust change lever so that it passes approximately 1.5 mm underneath the cam rocker when "stop" function is initiated.

Fig. 21

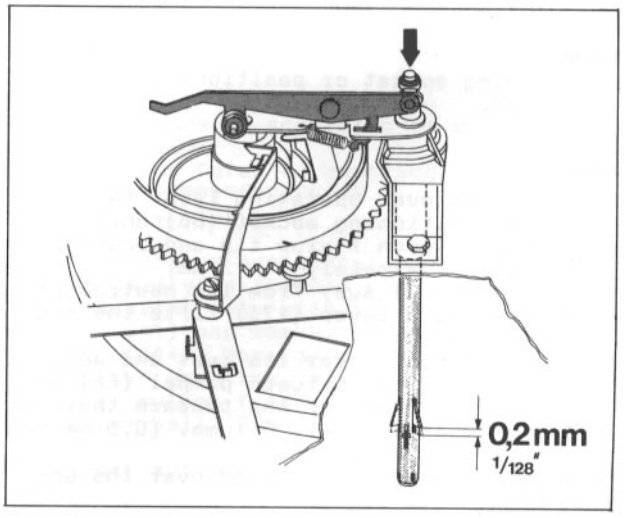


Trouble
Records do not drop.

Cause
Cam rocker has insufficient travel.

Remedy
Adjust travel with eccentric screw on cam rocker. Adjustment is correct when, with the main cam in neutral position and the changing spindle locked, the three supports of the changing spindle describe longitudinal movement of 0.2 mm when the change actuator stud is pushed up.

Fig. 22



Trouble	Cause	Remedy
Vertical tonearm movement restricted during set-down cycle	a) Excessive bearing friction b) Lift pin sticks in lift tube	a) Eliminate friction by adjustment of bearing screw (setscrew 41) and check balance. b) Remove lift pin and clean (described on page 9)
Tonearm moves with stylus pressure and anti-skating scale in zero position a) outwards, b) inwards	a) Anti-skating device out of adjustment b) Excessively taut tonearm leads producting torque	a) Adjust skating lever so that skating spring acts correctly at tonearm pivot. b) Slacken tonearm leads.
During change, start and stop operations, noise from the mechanism can be heard in speaker system	Muting switch maladjusted. Clearance between contact strips on muting switch excessive	By bending contact strips. Adjustment is correct when, with the main cam in neutral position, the gap between the wipers and the contact strips on the muting switch is approximately 0.5 mm. Spray contact springs with preservative (e.g. Kontakt 61) and check adjustment of contact strips.
No sound. The short circuit of the pick-up leads is no longer broken	Clearance between wipere and contact strips absent or insufficient	By adjusting contact strips. Adjustment is correct when, with the main cam in neutral position, the gap between the wipers and the contact strips on the muting switch is approximately 0.5 mm.
Motor will not shut off when tonearm is on arm rest	Suppression capacitor (in power switch) is defective (short circuit)	Renew suppression capacitor in power switch
Acoustic feedback	a) Chassis parts (e.g. connection leads) are touching base cutout. b) Connecting leads are too taut	a) Correct cutout according to instructions supplied with unit. Move leads. b) Slacken or extend leads

Trouble

Tonearm is hindered in its horizontal motion during change cycle.

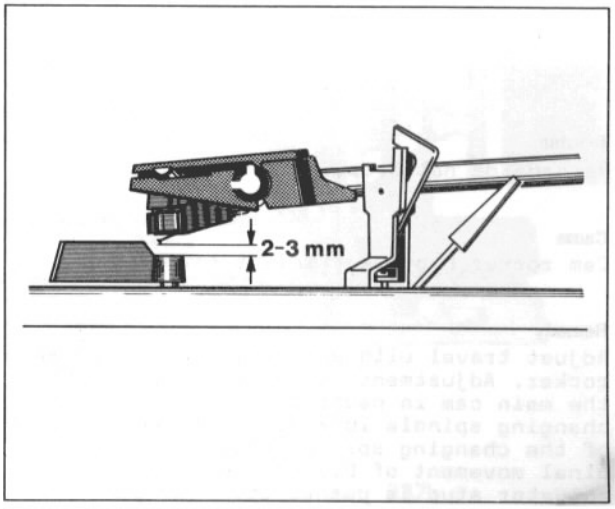
Cause

Positioning socket or positioning screw misadjusted.

Remedy

Move tonearm over operating lever (44) and turn the positioning socket (68) until the clearance between stylus tip and operating lever is approximately 2 - 3 mm.
Rotate cam (161) away from its neutral position until main lever (173) lifts the tonearm completely.
Swing the tonearm over its rest and adjust screw (57) so that between pimpel (66) and the resting surface of the tonearm there is a play of approximately 0.1 mm. (0.5 mm measured at tonearm head).
This play must be maintained over the entire horizontal swing.

Fig. 23



Replacement Parts

Pos.	Part.-No.	Description	Quantity	
1	215 470	Automatic spindle AS 12	1	
2	213 895	Automatic spindle AW 3	1	
3	220 213	Centring piece	1	
4	201 101	Centering pin	1	
5	228 111	Adjusting screw	1	
6	223 240	Chassis complete	1	
8	214 056	Washer	1	
9	200 543	Retaining ring	1	
10	229 776	Ring	1	
11	233 236	Turntable mat compl.	1	
12	233 237	Turntable compl. with mat	1	
13	229 743	Knob	1	
14	229 733	Scale ring	1	
15	230 529	Threaded piece	3	
16	230 523	Compression spring	3	
17	200 723	Rubber damping block	3	
18	200 722	Steel cup	3	
19	232 975	Spring mounted Footing compl.	3	
20	232 976	Tonearm head compl.	1	
21	231 992	Contact plate compl. with mass sheet	1	
22	201 132	Lift	1	
23	210 182	Bowed Lockwasher 4,2/8	1	
24	210 630	Washer 4,2/8/0,5 St	1	
25	210 197	Ring 4/0,8	1	
26	215 430	Cartridge mount TK 14 compl.	1	
27	232 978	Tonearm rest complete	1	
28	210 361	Hex nut BM 3	3	
29	200 718	Compression spring	2	
30	210 624	Washer 4,2/7/0,3 St	4	
31	201 632	Rubber washer	2	
32	200 713	Washer	2	
33	200 712	Spring cup	2	
34	200 711	Lockwasher	2	
35	214 047	Special screw	2	
36	214 210	Shipping screw compl.	2	
37	233 239	Weight compl.	1	
38	230 538	Plate	1	
39	230 978	Extension screw	1	
40	230 540	Clamping piece	1	
41	217 438	Setscrew	1	
42	229 721	Locknut	1	
44	230 891	Switch lever compl. (web height 2/8")	2	
	233 708	Switch lever compl. (web height 5/16")	1	
45	225 096	Dual emblem	1	
47	233 242	Plate 1226	1	
48	229 631	Adjuster serew	1	
49	229 745	Tonarm lift handle	1	
50	210 353	Hex nut BM 2	1	
51	233 238	Tonearm complete	1	
52	233 243	Weight complete	1	
53	230 531	Spindle for weight	1	
54	230 539	Extension screw	2	
55	227 569	Securing screw	1	
56	233 244	Spring barrel complete	1	
57	229 723	Setscrew	1	
58	232 068	Compression spring	1	
59	218 043	Washer 3,2/7/0,5 ST	1	
60	232 986	Bearing block complete	1	
61	229 720	Pointer	1	
62	229 738	Bearing screw complete	1	
66	216 844	Control unit	1	
67	210 143	Lockwasher 1,5	2	
68	218 318	Adjuster sleeve	1	
69	210 469	Machine screw	3	
70	229 794	Knob	1	
71	233 004	Cover complete with lift pin	1	
72	213 260	Semi-circular notched pin	4	

Fig. 24 Exploded view, parts above chassis

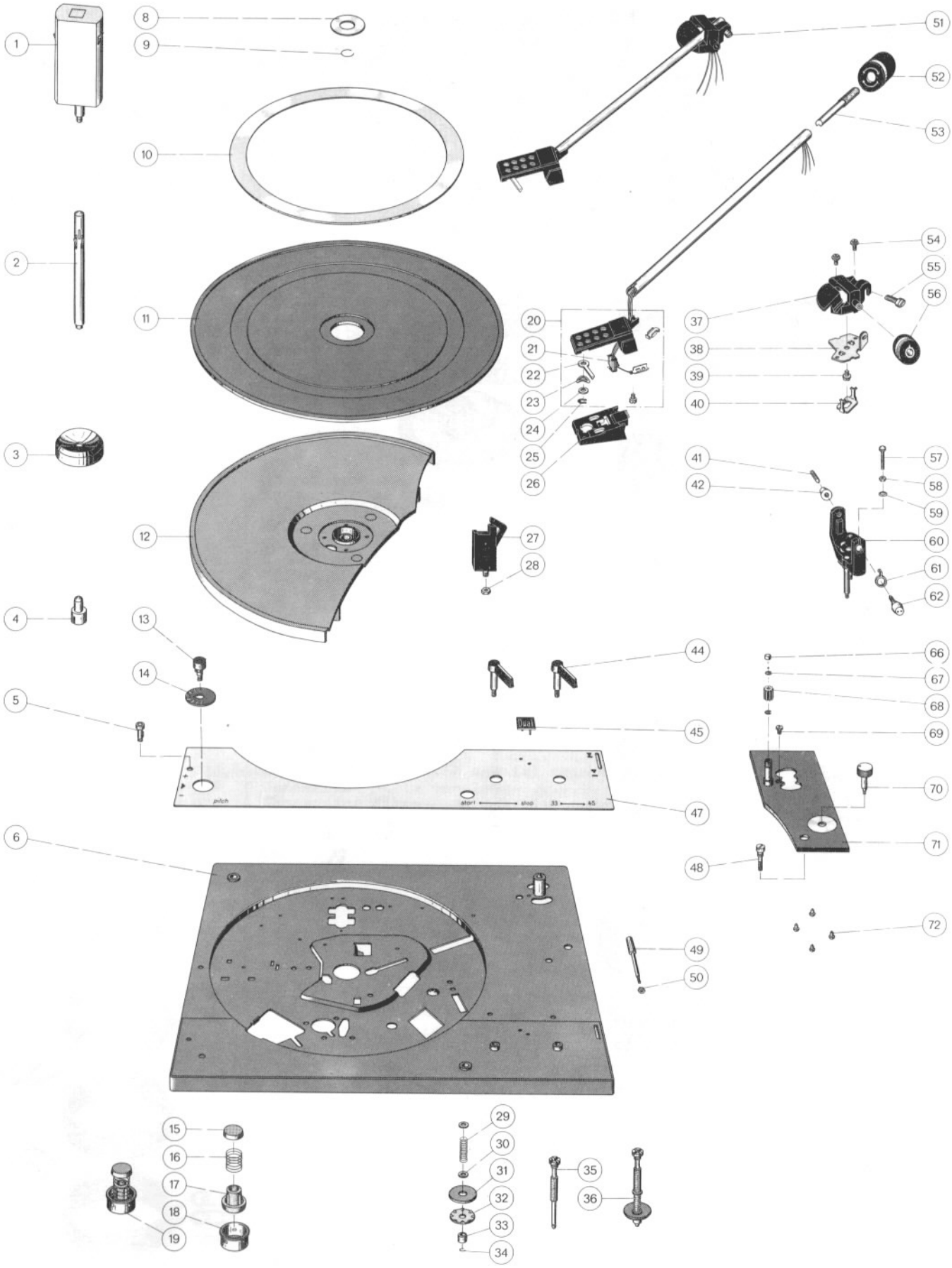
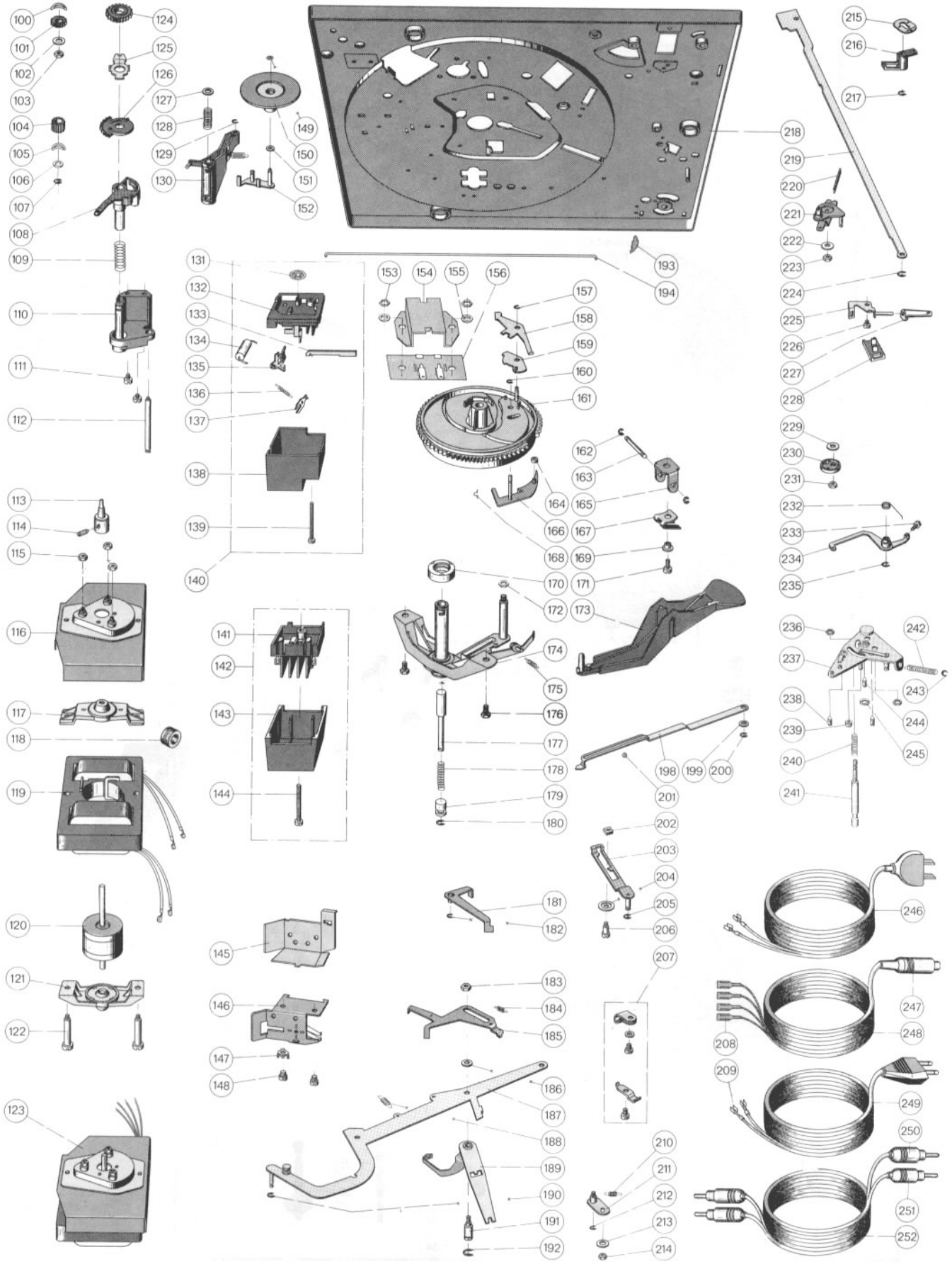


Fig. 25 Exploded view, parts below chassis



Pos.	Part.-No.	Description	Quantity	
100	232 439	Spring washer 6.4/11/0.15	1	
101	229 373	Adjuster wheel	1	
102	210 586	Washer 3.2/7/0,5 St	1	
103	210 362	Hexagon nut BM 3	5	
104	228 112	Adjusting wheel	1	
105	210 182	Lock washer, thr.	1	
106	228 113	Washer 4,2/8/1.0 St	1	
107	210 166	Lock washer 3,2	1	
108	229 370	Selector segment	1	
109	229 714	Compression spring	1	
110	229 663	Bracket complete	1	
111	210 472	Fillister head cap screw AM 3X4	2	
112	229 715	Bearing spindle	1	
113	232 898	Motor pulley 50 Hz complete	1	
	232 899	Motor pulley 60 Hz complete	1	
114	230 559	Set screw M 2.5 X 3,5	1	
115	210 366	Hexagon nut BM 4	3	
116	228 932	Screen plate complete	1	
117	233 038	Top bearing bracket complete	1	
118	209 939	Cable grommet	1	
119	233 020	Stator 110/220 V complete	1	
	233 018	Stator 150 V	1	
120	233 016	Rotor complete	1	
121	233 039	Bottom bearing bracket complete	1	
122	228 472	Centering screw	2	
123	233 014	4-pole motor AM 400 110/220 V complete	1	
	233 015	4-pole motor AM 400 150 V complete	1	
124	229 374	Regulator wheel	1	
125	229 695	Regulator plate	1	
126	229 372	Adjustment washer	1	
127	210 600	Washer 3,2/8/ 1 St	1	
128	229 716	Compression spring	1	
129	210 146	Lock washer 3,2	2	
130	229 672	Change lever	1	
131	223 625	Lockwasher 3	1	
132	233 012	Switch plate normal complete	1	
	233 013	Switch plate UL with special capacitor complete	1	
133	230 151	Slide	1	
134	209 505	Capacitor 10 u F/1000 V/10 %	1	
	230 355	Capacitor 68 u F/ 250 V/20 %	1	
135	230 148	Switch slide	1	
136	230 296	Tension spring	1	
137	219 200	Snap spring	1	
138	233 010	Cover normal complete	1	
	233 011	Cover UL complete (For KS 4 with connection plate)	1	
139	210 498	Fillister head cap screw M 3X28	1	
140	233 009	Power switch complete	1	
	233 008	Power switch UL with special capacitor complete	1	
141	233 007	Connection plate complete	1	
142	233 005	Connection plate complete with cover	1	
143	233 006	Connection plate cover complete	1	
144	210 501	Fillister head cap screw M 3X35	1	
145	229 748	Screen plate	1	
146	232 987	Muting switch complete	1	
147	211 614	Soldering lug	1	
148	210 469	Fillister head cap screw AM 3X3	2	
149	200 633	Lock washer	1	
150	217 888	Idler wheel complete	1	
151	229 719	Slip plate	1	
152	229 747	Swinging arm complete	1	
153	210 362	Hexagon nut BM 3	1	
154	233 089	Screen plate complete with insulating plate	5	
155	210 155	Serrated lock washer A 3,2	1	
156	227 254	Cynch socket plate	2	
157	210 144	Lockwasher	1	
158	229 635	Shut-off lever	1	
159	229 756	Friction plate	1	
160	210 145	Lockwasher 2,3	7	
161	232 988	Main cam complete	1	
162	210 145	Lock washer 2.3	7	
163	200 528	Spindle	1	
164	200 650	Rubber bush	1	
165	229 648	Bearing support	1	
166	229 755	Cam follower lever	1	
167	229 642	Leaf spring	1	
168	200 522	Snap spring	1	
169	200 458	Spacer bush	1	

Pos.	Part.-No.	Description	Quantity	
170	229 754	Ball bearing	1	
171	210 480	Fillister head cap screw AM 3X6	1	
172	210 366	Hexagon nut BM 4	1	
173	232 993	Main lever complete	1	
174	232 990	Bearing bridge complete	1	
175	227 045	Tension spring	1	
176	218 155	Hexagon screw M 4 x 6	2	
177	229 753	Change actuator stud complete	1	
178	213 920	Compression spring	1	
179	213 921	Bush	1	
180	210 145	Lock washer 2.3	7	
181	229 700	Switch slide	1	
182	210 145	Lock washer 2.3	7	
183	229 650	Extension nut	1	
184	229 686	Tension spring	1	
185	229 634	Start lever	1	
186	210 586	Washer 3.2/7/0.5 St	2	
187	229 674	Shift arm	1	
188	229 698	Tension spring	1	
189	229 757	Change lever complete	1	
190	210 145	Lockwasher 2.3	7	
191	229 654	Grooved pin	1	
192	210 147	Lock washer 4	1	
193	200 687	Retainer spring	1	
194	229 660	Control rod	1	
198	229 633	Shut-off slide	1	
199	201 187	Fiction washer	1	
200	210 145	Lock washer 2.3	1	
201	209 358	Ball 4.0	1	
202	219 049	Square section	1	
203	229 758	Pawl complete	1	
204	229 704	Washer 3.2/13/0.5 St	1	
205	210 145	Lock washer 2.3	7	
206	227 060	Bolt	1	
207	231 079	Cable clips complete	1	
208	209 436	Flat connector	4	
209	214 602	AMP connector	1	
210	231 017	Tension spring	1	
211	229 690	Start lever complete	1	
212	210 145	Lock washer 2.3	7	
213	210 641	Washer 4.2/10/1 St	2	
214	210 361	Hexagon nut M 3	3	
215	223 146	Securing spring	1	
216	229 362	Guide bearing	1	
217	210 145	Lock washer 2.3	7	
218	233 240	Fitting plate complete	1	
219	229 629	Positioning slide	1	
220	229 649	Leat spring	1	
221	229 759	Adjuster lever	1	
222	210 641	Washer 4,1/10/ 1 St	2	
223	210 361	Hexagon nut M 3	3	
224	210 145	Lock washer 2.3	7	
225	229 761	Bearing bracket	1	
226	232 373	Fillister head cap screw AM x 3	1	
227	229 679	Lift cam	1	
228	229 680	Brake section	1	
229	216 867	Bowed lockwasher	1	
230	220 899	Curve washer	1	
231	210 361	Hexagon nut M 3	3	
232	221 260	Torsion spring	1	
233	229 688	Adjusting screw	1	
234	229 796	Skating lever compl. with adjusting screw and torsion spring	1	
235	210 146	Lockwasher 3.2	2	
236	210 362	Hexagon nut BM 3	5	
237	233 241	Segment compl.	1	
238	229 772	Set screw M 2 x 4	2	
239	223 777	Guide	1	
240	216 853	Compression spring	1	
241	229 769	Lifting bolt	1	
242	218 591	Tension spring	1	
243	201 184	Adiusting washer	1	
244	216 830	Set screw short		
245	216 831	Look nut		
246	232 995	Power cable, US, complete	1	
247	209 424	Miniature plug for audio cable	1	

Pos.	Part.-No.	Description	Quantity	
248	207 303	Audio cable compl. with miniature plug and socket for plat prong	1	
249	232 996	Power cable Europa compl.	1	
250	209 425	Cynch plug, white	1	
251	209 426	Cynch plug, black	2	
252	226 817	Audio cable compl. with RCA-type plugs	1	
**	229 987	Mounting instructions	1	
**	230 747	Shipping carton compl.	1	
**	211 473	Stroboscope washer 50/60 Hz		
**	230 793	Operating instructions 1226, 4 languages		
**	231 306	Operating instructions 1226 UAP		
**	214 120	Hardware for cartridge mounting		
**	228 114	Adjusting lever	1	

** Parts not illustrated

Alterations reserved !

Lubrication

All bearings and friction surfaces have been adequately lubricated at the works. Replenishment of oil and grease is only necessary after about 2 years with normal use as the most important bearing points (motor bearings) are fitted with sintered metal bushes.

Lubricants should be applied sparingly to bearing points and friction surfaces. It is important that no oil or grease should come in contact with the friction faces of the idler wheel, motor pulley and platter as otherwise slip will occur. Avoid touching these parts for the same reason.

When lubricants of different types are mixed, chemical decomposition frequently occurs.

To avoid complications with lubricants we recommend using the original lubricants listed below.

The following lubricants should be used:

Renotac No. 342 adhesive oil

BP Super Viscostatic 10 W/30

Shell Alvania No. 2

Isoflex PDP 40

Silicone oil AK 500 000

Molykote

Fig. 26 Lubrication points above chassis

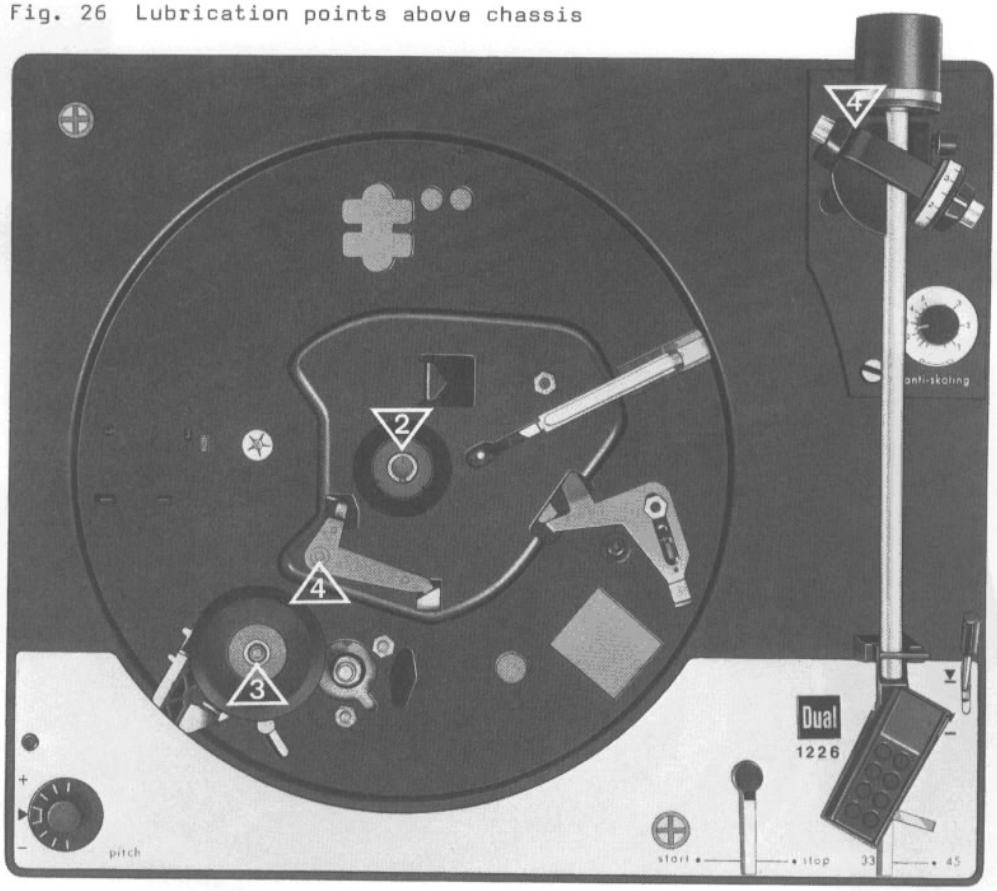


Fig. 27 Lubrication points below chassis